REMARKS

Claims 1-19 are pending in the application and are at issue.

THE REJECTION

Claims 1-17 stand rejected under 35 U.S.C. §103 as being obvious over Sun et al. U.S. Patent No. 6,124,391 ('391) in view of WO 96/30442 (WO '442). Claims 18 and 19 stand rejected under 35 U.S.C. §103 as being obvious over the '391 patent in view of WO '442 and further in view of Schultze et al. U.S. Patent No. 5,869,033 ('033). The basis of the rejection is that it would have been obvious to incorporate a clay as discussed in WO '442 into the superabsorbent polymer of the '391 patent, and thereby arrive at the presently claimed invention. For the reasons set forth below, it is submitted that this rejection is in error and should be withdrawn.

THE INVENTION

In view of the remarks made by the examiner in the Office Action, it appears that the examiner still misunderstands the claimed invention. Therefore, applicants again provide a description of the invention. This description is provided even though the examiner noted after a June 13, 2007 personal interview that the present claims distinguish over cited Sun et al. U.S. Patent No. 6,124,391, which discloses a *maximum* of 10 wt% of an inorganic powder. During the interview, applicants also thoroughly explained the claimed feature of the clay being "present in the vicinity of the surfaces of the superabsorbent particles." The examiner also noted the substantial difference between the structure of the presently claimed superabsorbent particles and the particles disclosed in cited WO 96/30442.

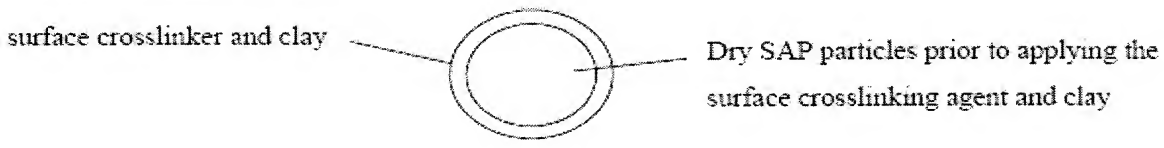
The present claims recite surface-crosslinked superabsorbent particles containing about 15% to about 35%, by weight, of a clay in the vicinity of the surfaces of the superabsorbent particles. These features are clearly and specifically set forth in claim 1 subparagraphs (ii), (iii)(d), and (iii)(e)., i.e., 1. (ii) about 15% to about 35%, by weight, of a clay, said clay present in the vicinity of surfaces of the superabsorbent particles; 1. (iii) (d) applying a mixture comprising a surface crosslinking agent and a clay to the surface of the superabsorbent particles of step (c) to provide surface-treated superabsorbent polymer

particles; and 1. (iii) (e) then heating the surface-treated superabsorbent polymer particles for a sufficient time at a sufficient temperature to surface crosslink the surface-treated superabsorbent polymer particles and position the clay in the vicinity of the surfaces of the surface-crosslinked superabsorbent particles.

The clay is *not* soluble in the surface crosslinking agent or any solvent used in the surface crosslinking step. As stated in the specification, the clays are swelling or nonswelling (page 22, line 35 through page 23, line 15), and accordingly are insoluble. The clay, as a solid, therefore, *cannot* penetrate deeply into the already formed superabsorbent particle to provide a particle having a clay homogeneously distributed throughout the particle.

In addition, the amount of surface crosslinker and solvent applied to the superabsorbent particle is sufficiently small such that the surface crosslinker and solvent remain in the vicinity of the surfaces of the superabsorbent particle. This allows for *surface* crosslinking of the particle. If the amount of surface crosslinker and solvent applied to the particle is large enough to penetrate throughout the particle, *surface* crosslinking would not be achieved because crosslinking then would *not* be greater in the vicinity of the surfaces of the particle.

As such, the presently claimed superabsorbent particles have a greater degree of crosslinking at the surfaces of the particles as a result of surface crosslinking (in addition to internal crosslinking) *and*, because the clay is applied with the surface crosslinker, the clay *must be* positioned at the vicinity of the surfaces of the particles, i.e., is *not* distributed *throughout* the volume of a particle. In fact, a particle that is surface crosslinked as set forth in claim 1 *cannot* have a clay distributed throughout the particle. A claimed superabsorbent polymer (SAP) particle therefore is visually depicted as follows (not to scale):



As recited in independent claim 1, the clay is added with the surface crosslinker to *dry* SAP particles (claim 1, subparagraphs (iii)(c) and (iii)(d)), and the clay *cannot* penetrate deep into the interior of the solid SAP particles. Therefore, as illustrated above, the clay is present in the vicinity of the particle surface *only*. The benefit of the present invention is that clay *on the surface* of superabsorbent particles enhances the fluid permeability of the particles and reduces the amount of fine-sized SAP particles.

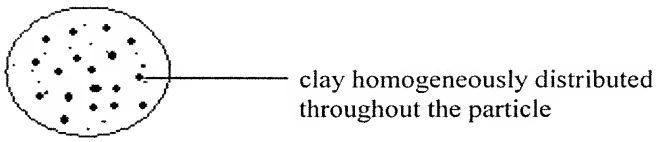
The superabsorbent particles of the present invention are surface crosslinked. As explained at the interview, surface crosslinked polymer particles are internally crosslinked during polymerization to impart water insolubility, *and* surface crosslinked *after* polymerization *and* drying to improve absorption properties. Surface crosslinked SAP particles therefore have a higher level of crosslinking at the vicinity of particle surfaces compared to uniformly crosslinked particles, i.e., particles that are only internally crosslinked. The reference "Modern Superabsorbent Polymer Technology" illustrates this feature at page 97, figure 3.9, and forwarded to the examiner with the response of December 18, 2006 as Exhibit A. Thus, the polymer particles according of the present invention are different from uniformly crosslinked particles.

THE CITED REFERENCES

The '391 patent discloses the preparation of dried SAP particles, admixing the dried SAP particles with 0.2 to 10 wt% of an inorganic powder and a surface crosslinking agent (column 7, lines 27-32 and 43-45), and heating the resulting mixture. The inorganic powder can be a clay. The inorganic powder can be added to the SAP particles before, during, or after the surface crosslinking step. Importantly, the '391 patent specifically discloses that the clay is added to the SAP particles in an amount sufficient to achieve anticaking properties, *up to a maximum* of 10 wt%, and preferably less than 10 wt%, (see '391 patent, column 7, lines 27-32). Additionally, the examples of the '391 patent are SAP particles having a clay concentration of 0.5 to 3 wt%.

WO '442 discloses the use of clay as filler (page 13, lines 1 to 3) to lower extractable levels and improve gel strength (page 13, lines 4 to 6). To achieve these benefits, the clay must be *homogeneously* distributed throughout the polymer particles (as opposed to

being present only in the vicinity of the surfaces of the particles). A particle disclosed in WO '442 can be visually depicted as follows:



Example 4 of WO '442 clearly demonstrates that the clay is homogenously distributed throughout the particles. In Example 4, a non-crosslinked polymer (Isobam™) is mixed with an internal crosslinker (propylene carbonate) and a clay (Bentonite SD-2). The clay is used as a filler and is *homogeneously* distributed throughout the crosslinked Isobam™ polymer particles.

WO '442 discloses Isobam™ and cycloalkylene glycols as suitable copolymers and crosslinkers, respectively (page 7, line 21 to page 8, line 11), and also discloses the *need* of an *internal* crosslinking reaction (page 8, lines 12-14). The three compounds, including the clay, must be *homogenously* mixed before crosslinking. Therefore, the clay in WO '442 *cannot be* present solely at the vicinity of the surfaces of the particles, but rather is distributed throughout the particle, as illustrated above.

Additionally, WO '442 fails to teach or suggest any surface crosslinking. Accordingly, WO '442 merely discloses uniformly crosslinked particles.

The '033 patent is directed to a method of preventing skin infection by fecal enzymes. The method involves contacting the skin with an organophilic clay. The clay can be dispersed in a matrix of SAP particles in a fabric ('033 patent, abstract). The clay particles are dispersed with the SAP particles. The '033 patent is silent with respect to surface crosslinking. The '033 patent merely discloses a dispersion of an organophilic clay with an SAP, i.e., *individual particles* of clay and SAP.

DIFFERENCES BETWEEN THE PRESENT CLAIMS AND THE CITED ART AND NONOBVIOUSNESS OF PRESENT CLAIMS

The Patent Office "has the burden under §103 to establish a prima facie case of obviousness." In *re Fine*, 837 F.2d 1071, 1074 (Fed. Cir. 1988); MPEP §2142 (8th Ed., Rev. 6, Sept. 2007)("The examiner bears the initial burden of factually supporting any prima facie conclusion of obviousness."). The Supreme Court recently identified a number of rationales that may be used to support a conclusion of obviousness, consistent with the framework set forth in its decision in *Graham v. John Deere Co.* See *KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1739-40 (2007). These and other representative rationales are described at MPEP §2143 (8th Ed., Rev. 6, Sept. 2007).

One of these rationales is entitled "A. Combining Prior Art Elements According to Known Methods To Yield Predictable Results". Under this rationale, the Patent Office must articulate four findings including

> "(2) a finding that one of ordinary skill in the art could have combined the elements as claimed by known methods, and that in combination, each element merely would have performed the same function as it did separately;
>
> (3) a finding that one of ordinary skill in the art would have recognized that the results of the combination were predictable."

As further stated in the MPEP §2143:

> "The rationale to support a conclusion that the claim would have been obvious is that all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with *no change in their respective functions*, and the combination would have yielded nothing more than *predictable* results to one of ordinary skill in the art at the time of the invention. [I]t can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does." If *any* of these findings *cannot* be made, then this *rationale cannot be used* to support a conclusion that the claim would have been obvious to one of ordinary skill in the art." (Emphasis added)

For the reasons set forth below, the present rejection cannot be maintained because the combination does not perform the same function as the separate elements and because a person skilled in the art would not have recognized the results as predictable.

As stated above, the '391 patent is directed to incorporating an anticaking and dedusting amount of an inorganic powder to SAP particles. The *maximum* amount of inorganic powder added to the SAP particles, as disclosed in the '391 patent, is 10 wt%. In contrast the present claims specifically recite a *minimum* amount clay of about 15%, by weight, i.e., an at least 50% increase in the amount of clay.

The '391 patent discloses amounts of inorganic powder typically used in the art to impart anticaking and dedusting properties to SAP particles. The '391 patent contains no teaching or suggestion that would motivate a person skilled in the art to increase the amount of inorganic powder above the disclosed maximum limit of about 10%, by weight, by at least 50%. In fact, persons skilled in the art would have had no incentive to increase the amount of inorganic powder above about 10 wt% because the '391 patent explicitly teaches that dedusting is achieved at inorganic powder amounts well below 10 wt% (e.g., see '391 examples). Therefore, persons skilled in the art would consider using any amounts of clay above 10 wt% as being wasted.

However, applicants have found that including a clay in the surface crosslinking step, in the claimed amount of about 15% to about 35%, by weight, provides the unexpected benefits of reducing the amount of fine-sized SAP particles *and* improving the fluid permeability of the clay-treated SAP particles. See specification, page 7, lines 32-35, and page 8, lines 12-16, for example. The reduction of fine-sized SAP particles is a long felt need in the art because fine-sized particles have invariably been generated during SAP production, and either are recycled in a time consuming, expensive process step or are discarded as waste.

Applicants further have provided objective evidence demonstrating the new and unexpected results provided by the presently claimed invention. In each of Examples 5 and 6, at pages 30-33 of the specification, applicants provide a series of SAPs containing varying amounts of clay added to the SAP during the surface crosslinking step. Example 5,

in the table at page 30, shows that an amount of clay disclosed in the '391 patent, i.e., 5% and 10 wt%, generates 20% and 16 wt%, respectively, of SAP particles having a diameter less than 200 μm (i.e., fine-sized SAP particles). By increasing the amount of clay to 15 wt% in accordance with presently claimed invention, fine-sized particles having a diameter less than 200 μm drops substantially to 4.5 wt%. Further increasing the amount of clay up to 35 wt% results in further decreases in the amount of fine-sized SAP particles. Applicants claims, therefore, are now tailored to the unexpected results provided in the disclosure (see Examples 5 and 6), which clearly distinguishes the present claims over the '391 patent.

As further illustrated above, WO '442 discloses particles having a clay distributed throughout the particles to improve gel strength and reduce extractables. WO '442 also fails to teach or suggest any surface crosslinking. In contrast, the present claims recite surface crosslinked particles having a clay present in the vicinity of the particle surfaces. WO '442 fails to provide any motivation or apparent reason for a person skilled in the art to modify the WO '442 teachings in the radical manner required to arrive at the presently claimed invention. Furthermore, contrary to the examiner's contentions, WO '442 does not teach a "substantially identical" polymer to the claimed particles. WO '442 does *not* teach a surface crosslinking agent, and WO '442 teaches a substantially different process for producing substantially different superabsorbent particles, i.e., teaches a homogenous incorporation of the clay in the particle.

WO '442 , therefore, does not overcome the deficiencies of the '391 patent. First, WO '442 discloses particles substantially different from the presently claimed particles, as discussed above, i.e., clay distributed throughout the particle and no surface crosslinking. Second, after reading the '391 patent, a person skilled in the art would not have been motivated to increase the amount of clay to greater than 10%, as discussed above. Although the type of particle disclosed in WO '442 may be able to incorporate up to 25% clay (because the clay is distributed throughout the particle), it does not correlate to the amount of clay can be present in the type of particle disclosed in the '391 patent. In fact, the '391 patent discourages such an increase in the amount of clay at the surfaces of the particles.

Therefore, for the reasons set forth above, it is submitted that claims 1-17 would not have been obvious over the '391 patent in view of WO '442 under 35 U.S.C. §103.

With respect to claims 18 and 19, these are additional embodiments of the present invention and are patentable for the same reasons presented above for claims 1-17. In particular, applicants do not rely solely upon the features recited in claims 18 and 19 for patentability, but rely on *all* the features recited in these claims, including the features of claim 1 and 15 from which claims 18 and 19 depend.

Furthermore, applicants maintain that the '033 patent does not overcome the deficiencies of the '391 patent and WO '442. The '033 patent merely discloses a mixture of organophilic clay particles with SAP particles, and incorporating the resulting dispersion into a fabric. The '033 patent fails tot each surface crosslinking or incorporating the clay onto the surfaces of the SAP particles. Furthermore, the '033 patent teaches a *homogeneous* incorporation of the organophilic clay throughout the SAP particle by the process disclosed at column 4, lines 47-64.

Therefore, for all the reasons set forth above, it is submitted that claims 18 and 19 would not have been obvious over a combination of the '391 patent in view of WO '442 and the '033 patent.

RESPONSE TO COMMENTS MADE BY THE EXAMINER

At page 5 of the Office Action, in paragraph 12, the examiner states that for an amount of clay up to 35%, the clay cannot be only in the vicinity of the surfaces of the SAP particle. Applicant previously explained that the clay is an *insoluble* solid, and when applied to a *solid* SAP particle during the surface crosslinking step can *only* be applied to the vicinity of the surfaces of the particle. How can a solid clay permeate to the center of a solid particle when applied with a surface crosslinking agent and solvent that do not penetrate to the center of the particle? See page 8, above. Furthermore, the examiner's statement is no more than an unsubstantiated assertion with no support. Applicants have provide examples containing 35%, by weight, clay in the vicinity of the surface of the SAP particle (See Examples 5 and 6).

At paragraph 13, the examiner is attempting to redefine applicants' invention, and apparently has ignored prior reasoning provided as to why the claimed range of clay is up

to about 35%, by weight. As previously explained, the amount of clay *can* be increased above 35%, as suggested by the examiner, but a further reduction in fine particles is minimal and, at the same time, absorbing properties of the SAP particles are *adversely affected.* Accordingly, contrary to the examiner's statement, it makes perfect sense to limit the amount of clay to about 35%. In addition, applicants query why the examiner is attempting to redefine applicants claim features, rather than merely examining the claims presented.

With respect to paragraph 14 of the Office Action, applicants have provided objective evidence of unexpected results, in particular over the '391 patent. See pages 12 and 13, above. The '391 patent teaches a maximum amount of clay of 10%, by weight. Applicants minimum amount of clay is 15%, by weight. Example 5 of the present specification contains test data showing that 10%, by weight, clay generates 16 wt% particles of < 200 μm. Accordingly, applicants *have* compared the present claims to the closest prior art (the '391 patent *discloses* a maximum of 10%, by weight, clay). Contrary to statements made by the examiner, applicants have presented *factual evidence*, including experimental data, of unexpected results. Applicants have provided data showing that particles having 5% or 10%, by weight, clay at the particle surface (i.e., the '391 patent) are inferior to particles having 15%, by weight, clay at the particle surfaces (see Examples 5 and 6).

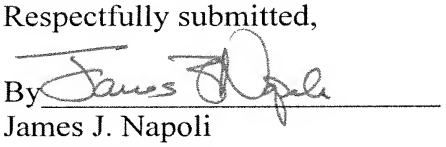
For all the reasons set forth above, it is submitted that claims 1-19 would not have been obvious over the '391 patent in combination with WO '441, or in further combination with the '033 patent, and that the present rejection should be withdrawn.

The pending claims are in a form and scope for allowance. An early and favorable action on the merits is respectfully requested.

Should the examiner wish to discuss the foregoing, or any matter of form in an effort to advance this application toward allowance, the examiner is urged to telephone the undersigned at the indicated number.

Dated: January 7, 2008

Respectfully submitted,

By 

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